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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,606	10/22/2003	Koichi Sakamoto	F03-161818M/SW	4797

21254 7590 07/20/2007

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EXAMINER	
TRAN, NHAN T	
ART UNIT	PAPER NUMBER
2622	

MAIL DATE	DELIVERY MODE
07/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/689,606	SAKAMOTO ET AL.	
	Examiner	Art Unit	
	Nhan T. Tran	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 April 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The replacement drawing (Fig. 1) filed 4/30/2007 is accepted.

Specification

2. Amendments to specification filed 4/30/2007 are accepted.

Response to Arguments

3. Applicant's arguments filed 4/30/2007 with respect to claims 1-19 have been fully considered but they are not persuasive.

The Applicant asserts:

(i) Lou does not teach or suggest "wherein said noise reduction is selectively performed based on an operating mode of a device performing said image processing." as required by claims 1 & 6 (Remarks, page 11).

(ii) The references to Ray, Lobo, Luo and Sannoh are unrelated. There are no suggestion or motivation to combine the references, and the combination is based on improper hindsight (Remarks, pages 11-14).

(iii) Neither Ray, nor Lobo, nor Luo, nor Sannoh teaches or suggests "control unit for operating said face region identification unit and said noise reduction unit depending on said photography mode." (Remarks, pages 12-14).

In response, the Examiner understands the Applicant's arguments but respectfully disagrees with the Applicant's assessments of the claims as follows:

(i) In Luo, "an operating mode" is represented by the image enhancement mode in which noise reduction is only performed on the face region detected by the subject matter detectors to avoid creating enhancement artifacts in some other image areas (Fig. 1; col. 2, lines 60-66 and col. 7, lines 36-38). It is noted that operating modes in Lou are: an operating mode for detecting a subject matter (22, 20 in Fig. 1) and an operating mode for enhancing image (44, 40 in Fig. 1). Since the claimed "an operating mode" is broadly recited, it reads on the image enhancement mode as discussed above.

(ii) All references to Ray, Lobo, Luo and Sannoh are, indeed, **related** to a common image processing based on **a detected human face** in a captured image (please refer to abstract and detailed description for each of the references or as cited in the previous office action). There are clear motivations/suggestions to combine the references as cited in the previous office action. Specifically, Lobo suggests to perform contour correction (edge enhancement) prior to face detection for increasing variation at an edge in the image in order to better detect curved shapes of a facial image in a subsequent face detection (see Lobo, col. 4, lines 15-25). Luo suggests to perform noise reduction in addition to other processing (i.e., color balance adjustments) so as to further enhance the image based on detected face region (see Luo, col. 7, lines 36-38 and col. 11, lines 37-42). Furthermore, Sannoh clearly teaches that the image capture device executes face detection algorithm for detecting a human face in a scene when the device is set to a portrait mode because, in the portrait mode, it is necessary to focus camera lens on the face of a person in the scene as a high priority in comparison

to other modes (see Sannoh, Figs. 5A-5D and [0136]). Thus, the combination of Ray, Lobo, Luo and Sannoh are properly established in making a prima facie case of obviousness.

(iii) The Examiner would like to clarify that Ray already teaches an user interface (50) that allows the user to select "a framing mode" or "a final image mode." Each of these modes is representing "a photography mode." (see Ray, Fig. 1, col. 6, lines 48-55). Furthermore, in either photography mode above, face detection algorithm is executed in Ray (see Figs. 3 & 4; col. 6, lines 58-64 and col. 8, lines 56-63). Therefore, the references of Lobo and Luo are not relied upon for teaching of "a photography mode." Instead, Lobo and Luo are relied upon for the teachings of performing contour correction before face detection and performing noise reduction as a final image enhancement after all other processing (see Lobo, Figs. 1-3, col. 3, line 54 – col. 4, line 52, and Luo, Fig. 1, col. 7, lines 36-38 and col. 11, lines 37-42). Additionally, Sannoh is relied upon for the teaching of face detection when the camera is set to a portrait mode while the noise reduction was already taught by Luo as discussed above.

In view of the above, the rejection of claims 1-7 is maintained. New claims 8-19 are also rejected as set forth below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 1 & 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Luo et al. (US 7,092,573 B2).

Regarding claim 1, Luo (hereafter referred as "Luo") discloses an image processing method for performing image processing on image data (Fig. 1; col. 1, lines 5-9) comprising:

generating face region information (a person face 100 shown in Fig. 2, col. 10, lines 63-65) to identify the face region (face region 95 is identified as shown in Fig. 3) from said image data (see col. 11, lines 17-22 and col. 5, lines 37-55, wherein a face region is identified by the subject matter detector by creating a belief map);

and performing noise reduction on the face region of said image data based on said face region information, wherein said noise reduction is selectively performed based on an operating mode (image enhancement mode) of a device performing said image processing (see Fig. 1, steps 40 & 60; col. 7, lines 36-38 and col. 11, lines 37-42).

Regarding claim 6, Luo discloses an image processing program executable by a computer to perform an image processing method for performing image processing on

image data (Fig. 1; col. 3, lines 40-66 and col. 12, line 66 – col. 13, line 10), wherein the method comprising steps as discussed in claim 1 above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2, 3, 8, 9, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ray et al. (US 6,940,545 B1) in view of Lobo et al. (US 5,835,616) and in further view of Luo et al. (US 7,092,573 B2).

Regarding claim 2, Ray et al. (hereafter referred as "Ray") discloses a digital camera (a digital camera 10 shown in Fig. 1; col. 2, lines 24-35 and col. 4, lines 15-22) comprising:

an image processing unit (CPU 30 executes algorithms 80, 82, 88, 90, etc. shown in Figs. 1-3) that performs image processing (e.g., face detection, exposure control, color balance, red-eye correction, etc.) on a shot image (Figs. 1-3; col. 2, lines 24-35, col. 5, lines 20-41 and col. 9, lines 1-5);

a face region identification unit (Fig. 1, face detection algorithm 90) that analyzes an image to generate face region information to identify the face region (see steps 120-130 and 220-230 in Figs. 3 & 4; col. 6, lines 60-64 and col. 8, lines 55-67);

a photography mode determination unit (Fig. 1, user interface 50) that determines the photography mode (i.e., framing mode or final image mode) of said shot image (col. 6, lines 48-55);

a control unit (Fig. 1, CPU 30) that operates said face region identification unit depending on said photography mode (see Figs. 3 & 4; col. 6, lines 58-64 and col. 8, lines 55-67, wherein the face detection algorithm is executed to identify a face region in the shot image when the camera is set to either a framing mode or a final image mode).

Ray does not explicitly disclose the image processing means performing a contour correction on the shot image before identifying a face region.

In the same field of endeavor, Lobo et al. (hereafter referred as "Lobo") teaches an imaging processing apparatus that performs contour correction (edge enhancer at a first stage 110 in Fig. 2 that corrects contour of objects or so called edges of objects in an image to help identifying a face region) in a first stage (110) prior to actual detecting stages (120-150 and 210-270) for detecting a face region (chin, face oval, eyes, nose, mouth) on an image so as to increase intensity variation at an edge in the image in order to better set forth curved shapes of a facial image for subsequent face detection stages (see Lobo; Abstract; Figs. 1-3 and col. 3, line 54 – col. 4, line 52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a contour correction processing before identifying a face region in the camera of Ray so that the intensity variation near an edge of an image subject is increased to better set forth curved shapes of a facial image for subsequent face detection stages as suggested by Lobo.

As discussed above, Ray in view of Lobo teaches processing to correct contour on a shot image before face detection for detecting a face region and then exposure control, red-eye correction, color balance, etc. are executed after contour correction and face detection depending on a photographing mode (a framing mode or a final image mode as disclosed by Ray in Figs. 2 & 3; col. 5, line 5-41; col. 6, lines 48-55 and col. 9, lines 1-5). Ray and Lobo do not explicitly teach a noise reduction unit for performing noise reduction on the face region of the image after contour correction based on said face region information, and said noise reduction unit is operated by the control unit.

However, as taught by Luo, an image processing apparatus performs image enhancement (Fig. 1, steps 40, 44, 60, 70) including noise reduction in addition to color balance adjustments on a human face region (face region 95 shown in Fig. 3) of an image *after* the face region was identified by face region identification algorithm so as to further enhance the image based on the detected region (see Luo, col. 7, lines 36-38; col. 11, lines 17-22, 37-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Ray, Lobo and Luo to arrive at the applicant's claimed invention by additionally providing a noise reduction unit to the digital camera for performing noise reduction on the face region of the image after face identifying process (also after contour correction as discussed above) based on said face region information, and said noise reduction unit is operated by the control unit depending on said photographing mode (i.e., a framing mode or a final image mode). As doing this, the image quality would be further enhanced by removing noise in

addition to color adjustments on the detected face region of the image as suggested by Luo in col. 11, lines 37-42.

Regarding claim 3, Ray also discloses that the digital camera further comprising: a photography mode switch on a main body of said camera (see col. 6, lines 48-55, wherein "a photography mode switch" is inherently in the disclosed digital camera body for switching between the framing mode and final image mode), wherein said photographing mode determination unit determines said photographing mode based on a mode selection signal from the photographing mode switch on the camera main body (see Fig. 1; col. 2, lines 24-35 and col. 6, lines 48-55).

Regarding claim 8, Ray and Lobo in view of Luo also discloses that the noise reduction unit performs noise reduction exclusively on said face region using a low-pass filter (see Luo, col. 2, lines 60-66; col. 7, lines 36-38 and col. 8, lines 51-52).

Regarding claim 9, Ray and Lobo in view of Luo further discloses that said face region comprises a plurality of face regions, said face region deification unit identifying said plurality of face regions and said nose reduction unit performing noise reduction on said plurality of face regions (see Ray, col. 2, lines 24-35 and Luo, col. 5, line 51).

Regarding claim 11, Ray further discloses a shutter button (52) and an operation switch (50, 56, 58) which are connected to said control unit (see Fig. 1), wherein said

control unit performs control including at least one of automatic focus, automatic exposure, and automatic white balance based on an input from one of said shutter button and said operation switch (see Ray, col. 4, lines 22-30 and col. 5, lines 12-16, wherein at least automatic exposure is performed by program exposure button 56 shown in Fig. 1).

Regarding claim 12, see the analysis of claim 11 for automatic focus, wherein a lens is shown in Fig. 2 of Ray.

Regarding claim 13, it is clearly seen in Ray that when the camera is in focus, a CCD is in a position corresponding to a focal point of said lens (see col. 4, lines 22-26).

6. Claims 4, 5, 7, 10, 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ray et al., Lobo et al. and Lou et al. as applied to claim 2 and in further view of Sannoh et al. (US 2003/0071908 A1).

Regarding claim 4, as analyzed in claim 2 above, the combination of Ray, Lobo and Lou teaches the control unit operates said face region identification unit and said noise reduction unit based on said photographing mode (i.e., framing mode or final image mode) determined by said photographing mode determination unit.

Ray, Lobo and Lou are silent about said photographing mode determined as a portrait mode. However, such a portrait mode is taught by Sannoh et al. (hereafter

referred as "Sannoh"). According to Sannoh, the control means (CPU 115a) of a digital camera (Fig. 2) executes face detecting processing to detect a face region in a captured image for further image processing when a mode switch (212 shown in Fig. 1C) is set to a portrait mode (Figs. 5A-5D) because the face detection processing is necessary for focusing the camera lens on the face in the portrait mode while it is not needed in a landscape mode as disclosed in paragraph [0136].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify the digital camera of the combination of Ray, Lobo and Luo in view of teaching of Sannoh to provide a portrait mode in which the control unit operates the face region identification unit and the noise reduction unit when the portrait mode is selected so that the most important part (the face) of the captured image is considered and processed at a high priority as suggested by Sannoh above.

Regarding claim 5, the combination of Ray, Lobo and Lou teaches the control means operates said face region identification unit and said noise reduction unit based on said photographing mode (framing mode or final image mode) determined by said photographing mode determination unit as analyzed in claim 2.

Although Ray discloses the framing mode and the final image mode in col. 6, lines 48-64 and col. 5, lines 41-62, a high-speed photographing mode is not disclosed. Lobo and Lou are also silent about the photographing mode determined as a high-speed photographing mode.

However, such a high-speed photographing mode is taught by Sannoh. According to Sannoh, the control means (CPU 115a) of a digital camera (Fig. 2) executes face detecting processing to detect a face region in a captured image for further image processing when a mode switch (212 shown in Fig. 1C) is set to a motion picture mode *or* a still picture mode (note that the motion picture mode captures *more images per second* at a higher speed compared to the still picture mode, the motion picture mode is thus considered as a high-speed photographing mode) so that the human object (i.e., a human face) is appropriately processed for recording even during a motion mode (see Sannoh, paragraph [0195]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify the digital camera of the combination of Ray, Lobo and Luo in view of teaching of Sannoh to provide a high-speed photographing mode, wherein the control unit operates the face region identification unit and the noise reduction unit when the high-speed photographing mode is selected so as to record more images per second a high speed while maintaining the face region of captured image to be always detected and processed to remove noise appropriately for enhancing image quality.

Regarding claim 7, all limitations of claim 7 are also met by the analysis of claim 5.

Regarding claim 10, the combined teachings of Ray, Lobo, Luo and Sannoh also teaches that said control unit controls said face region identification unit and said noise reduction unit (see Luo, col. 2, lines 60-66 and col. 7, lines 36-38) for noise reduction on face regions when a face is detected) such that said analyzing said information to identify said face region and said noise reduction are not performed when a mode (e.g., landscape mode taught in Sannoh, [0136]) other than a high-speed photography mode and a portrait mode are determined by said photography mode determination unit. It is noted that, in the landscape mode, the face detection is not executed in Sannoh and thus the noise reduction on face regions is neither executed in Luo since there is no detected face.

Regarding claim 14, Ray discloses that the image signals are RGB signals (see Ray, col. 12, line 43) but Ray, Lobo and Luo are silent about an analog signal processor for performing analog processing on a picture signal which is output from said CCD, and outputting RGB signals corresponding to said picture signal.

As taught by Sannoh, the digital camera includes an analog signal processor (CDS & AGC) for processing analog signals output from CCD and then outputting RGB signals to A/D converter for further processing. The implementation of analog signal processor (CDS & AGC) is for performing correlated double sampling of the analog signals and automatic gain control so as to remove predetermined noise (i.e., fixed pattern noise) and strengthen the analog signals as preliminary image processing prior to subsequent image processing (see Sannoh, [0076]).

Therefore, it would have been obvious to one of ordinary skill in the art to provide an analog signal processor (CDS & AGC) to process the analog RGB signals from the image sensor so as to remove predetermined noise (i.e., fixed pattern noise) while strengthening the analog signals in a preliminary image processing step prior to subsequent image processing as taught by Sannoh above.

Regarding claim 15, see the analysis of claim 14 for the CDS & AGC circuits.

Regarding claim 16, see the analysis of claim 14, wherein the analog RGB signals output from CDS and AGC circuits are then sequentially converted into digital RGB signals by A/D converter (see Sannoh, [0076]).

Regarding claim 17, Ray, Lobo and Luo in view of Sannoh further teaches a digital signal processor (IPP 104 in Sannoh) for converting said digital signals into image data comprising luminance (Y) and color-difference data (U and V) to easily process the image signals for displaying and compression (Sannoh, [0077]). Therefore, it would have been obvious to one of ordinary skill in the art to convert the digital RGB signals into luminance data and color-difference data by a digital signal processor so as to easily process the image signals for displaying and compression.

Regarding claim 18, also disclosed by the combined teaching of Ray, Lobo, Luo

and Sannoh is a memory (RAM 42 shown in Ray or DRAM 107 shown in Sannoh) for temporarily storing said image data (see Sannoh, [0079]).

Regarding claim 19, also disclosed by the combined teaching of Ray, Lobo, Luo and Sannoh is that said face region identification unit recites said image data from said memory and generates said face region information by using said image data (see Sannoh, [0145]).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

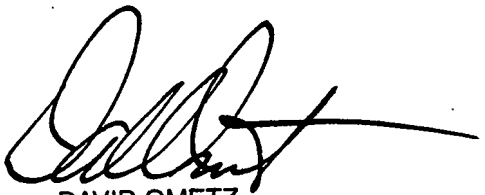
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NHAN T. TRAN
Patent Examiner



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